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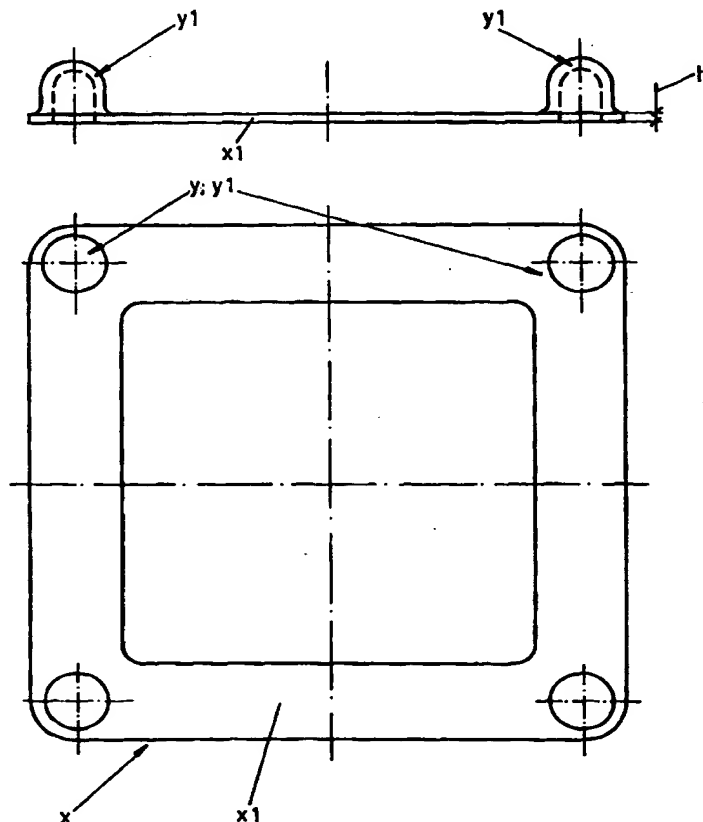
INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<b>(51) International Patent Classification <sup>6</sup> :</b> <b>E01C 13/04, 5/20, E04F 15/10, A63C 19/12</b>	<b>A1</b>	<b>(11) International Publication Number:</b> <b>WO 98/46830</b> <b>(43) International Publication Date:</b> 22 October 1998 (22.10.98)
<b>(21) International Application Number:</b> PCT/FI98/00387 <b>(22) International Filing Date:</b> 8 April 1998 (08.04.98) <b>(30) Priority Data:</b> 971594 16 April 1997 (16.04.97) <i>16 Oct 99 / 30 Nov 99</i> <b>(71) Applicant (for all designated States except US):</b> VARIFORM OY [FI/FI]; Matalasalmenkuja 1, FIN-00150 Helsinki (FI). <b>(72) Inventor; and</b> <b>(75) Inventor/Applicant (for US only):</b> WALTANEN, Jarkko [FI/FI]; Aurorankatu 15 B 19, FIN-00101 Helsinki (FI). <b>(74) Agent:</b> KANGASMÄKI, Reijo; Finnish Patent Consulting FPC, Hermiankatu 14, FIN-33720 Tampere (FI).		<b>(81) Designated States:</b> AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, GM, GW, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).  <b>Published</b> <i>With international search report.</i> <i>In English translation (filed in Finnish).</i>

**(54) Title:** JOINT ARRANGEMENT

**(57) Abstract**

The invention relates to a joint arrangement for a surface structure, such as a protecting plate, element or the like, which surface structure is meant particularly for covering of ground together with one or several other surface structures for temporary protecting, coating and/or like of the ground. In connection with the surface structure there has been arranged at least a joint arrangement for removable attachment of one or several adjacent surface structures to the same and the thermal insulation (1), that comprises at least one, essentially plastic based, such as cellular, expanded, foamed plastic structured or a like thermal insulation layer (1'). The joint arrangement comprises a joint piece (x), by means of which the surface structures may be coupled with each other essentially by corners of the same by means of a locking assembly (y) operating advantageously by quick-locking principle.



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## Joint arrangement

The invention relates to a joint arrangement for a surface structure, such as a protecting plate, element or a like, which surface structure is meant particularly for covering of ground together with one or several other surface structures for temporary protecting, coating and/or like of the ground. In connection with each surface structure there has been arranged at least a joint arrangement for removable attachment of one or several adjacent surface structures to the same and a thermal insulation, that comprises at least one, essentially plastic based, such as cellular, expanded, foamed plastic structured or a like thermal insulation layer. The joint arrangement comprises a joint piece, that is to be coupled by means of a locking assembly, for coupling of the adjacent surface structures with each other essentially by corners of the same, which joint piece comprises known as such a right-angled, such as a square shaped frame part, whereby the locking assembly is arranged by projections placed at the corners of the frame part and preferably by recesses of the same shape, that are placed underside the surface structure. To the bottom surface of the surface structure there has been arranged preferably an integral support arrangement, that comprises a platform structure projecting from the basic wall thickness of the surface structure, such as the thermal insulation layer.

For the purpose above, particularly for covering a field of grass or e.g. of ice, it is previously known to use most heterogeneous arrangements. For example covering elements being sold nowadays by the name TERRAPLAS represent particularly more developed solutions, that are made of plastics by injection moulding. To minimize mass of the covering element in question, it has been produced as a perforated

structure in a way, that not any actual thermal insulation effect may be achieved by the type of covering element. Correspondingly the support arrangements to support the covering elements against the ground must furthermore be attached to the covering elements by means of totally separate auxiliary devices and work stages. In addition to this locking arrangements connecting the covering elements to each other must be attached separately as well, so that a uniform and seamless covering may be achieved by the type of covering elements. The "perforated" structure of the type of covering element above does not either enable exploitation of a so called green house phenomenon particularly in connection with a grass field.

The perforated structure of the covering element in question is naturally advantageous with a view to the breathing of the ground, but the perforation causes in addition to a "rough" appearance and to those thermal insulation problems being described above such disadvantage as well, that garbage may get collected between the covering and the ground, which naturally eliminates good points of the covering element in question in this respect.

On the other hand it is previously known to use e.g. styrox particularly for covering of ice fields, that has been surrounded by both sides of the same by plywood plate. This type of solution is naturally not applicable as such to be installed particularly on a grass field, in case not totally separate foot structures are being used to raise the covering structure apart from the ground. On the other hand when being used in connection with an ice field, such problem of this type of solution has been found, that the plywood plates tend to freeze to the ice, that is why loosening of the same is laborious. In addition to that the type of constructions are very heavy, that is why

storing as well as use of the same for actual coating is disproportionately difficult.

5 On the other hand Finnish Patent Application No. 964199 discloses a protective structure, the thermal insulation of which comprises advantageously a plastic based, such as cellular, expanded, foamed plastic structured and/or a like thermal insulation layer, to the bottom surface of which there has been arranged an  
10 integral support arrangement, that comprises a platform structure projecting from the basic wall thickness of the thermal insulation layer particularly in order to achieve an air space between the protective structure and the ground under the same.

15 The solution in question is very advantageous in practice, which is due to the fact, that the thermal insulation placed between the ground and the protective structure gets more efficient thanks to the air space between the protective structure and the ground.  
20 In this case the feet, that are arranged as an integral platform structure directly to the bottom surface of the thermal insulation layer, prevent first of all so called burning of the grass that is left under the protective structure. In the application in question  
25 there has been shown furthermore an advantageous embodiment for coupling of the protective structures with each other by means of joint arrangements, that are arranged to the protective structures in an  
30 integral manner during manufacturing of the same and that operate e.g. by quick-locking principle. During tests in practice it has been found justified to improve particularly the joint arrangement coupling the protective structures with each other in such  
35 respect, that the protective structures could be on the other hand assembled as easily as possible but however locked in connection with each other reliably and seamlessly.

E.g. application document DE 27 17 625 discloses a covering assembly, that is applicable for temporary covering of ground in principle, wherein three or four covering elements being placed on the ground are being attached by means of a joint piece coupling the covering elements together by the corners of the same and that has holding rings of suitable shape for arrowlike locking pins, that are placed at the corners of the covering elements. The joint pieces being used in this solutions are placed, however, essentially underneath the actual covering elements, that is why they must be sunk into the ground, that is why they are not applicable as such to be used in connection with the type of thin surface structures as being discussed in this connection. On the other hand application document DE 25 58 967 discloses a base structure arrangement, that is to be put together e.g. by stone based elements, in which e.g. four bottom plates are being attached by corners of the same by means of a square shaped joint piece. At corners of the same there are pins, that may be attached to corresponding holes being placed at the corners of the bottom plate. This solution is not either applicable to be used for the type of use of the invention in question, because the bottom plates get supported by the corners of the same on the joint pieces. That is why with the type of solution as such, an entirety operating satisfactorily enough may not be achieved in connection with thin plastic structured covering elements being included to the invention in question. Furthermore application document DE 44 14 341 discloses separate joint arrangements to be used for connecting of concrete plates, that are intended for the corresponding purpose as the above application document. This solution is not as described above either applicable to be used for the type of use of the invention in question, whereby an adequately functioning entirety may not be achieved either, particu-

larly when being used in connection with thin plastic structured covering elements.

5 It is the aim of the joint arrangement according to this invention to achieve a decisive improvement for this purpose in other words particularly for making the installation of a removable covering structure more efficient and for securing staying together of the same and thus to raise substantially the level of  
10 prior art. To achieve this aim the joint arrangement according to the invention is primarily characterized in, that the frame part of the joint piece, that has an open center, such as a framework-like structure is arranged to pass the recesses existing in the platform  
15 structure, whereby the height of the recesses is arranged to correspond essentially at least to the thickness of the frame part.

20 As the most important advantages of the joint arrangement according to the invention may be mentioned easy installation of the surface structures enabled by a joint piece belonging to the same as well as simplicity and technical workability of the construction and manufacturing of the same as well. The invention  
25 enables first of all a very smooth covering, which is applicable for most heterogeneous purposes, that is carried out by joint pieces, that remain out of sight under the corners of the surface structures during the installation phase, whereby the surface structures to  
30 be coupled with each other may be connected to each other very quickly to form a surface structure, that is adequately smooth and seamless. As an advantageous embodiment the joint piece has a square shaped framework, by means of which e.g. four surface structures  
35 may be connected with each other by means of one joint piece operating by quick-locking principle, e.g. by cooperation of locking recesses, that are placed at the corners of the same, and projections, that are

placed at the corners of the joint piece. As an advantageous embodiment the frame part of the joint piece is arranged furthermore to pass the recesses of the platform structure in a way, that the total thickness of the surface structure is not increased therefor. Furthermore, when male couplers, that are placed advantageously at opposite edges of each surface structure, and female couplers, that are placed correspondingly at opposite edges, are being used and that are being placed furthermore at the bottom edges of the outer edges of the surface structures, the covering structure may be coupled in an extremely simple way by continuously "dropping" the following surface structure to be installed from above to its place and by connecting the same to the already installed surface structures by means of joint pieces by corners of the same.

Advantageous embodiment of the joint arrangement according to the invention are represented in the dependent claims related to the same.

In the following description, the invention is illustrated in greater detail with reference to the appended drawings, in which

Fig. 1 shows one advantageous surface structure related to the joint arrangement according to the invention,

Figs 2a - 2c

show furthermore the surface structure being shown in fig. 1 as a detail seen from above (2a), and some advantageous coupling means arrangements as partial side-views for the part of female couplers (2b) and male couplers (2c), and



Figs 3a and 3b

show an advantageous joint piece belonging to the joint arrangement according to the invention as a side-view and seen from above.

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The invention relates to a joint arrangement for a surface structure, such as a protecting plate, element or a like, which surface structure is meant particularly for covering of ground together with one or several other surface structures for temporary protecting, coating and/or like of the ground. In connection with each surface structure there has been arranged at least a joint arrangement for removable attachment of one or several adjacent surface structures to the same and thermal insulation 1, that comprises at least one, essentially plastic based, such as cellular, expanded, foamed plastic structured or a like thermal insulation layer 1'. The joint arrangement comprises a joint piece x, that is to be coupled by means of a locking assembly y, for coupling of the adjacent surface structures with each other essentially by corners of the same, which joint piece x comprises known as such a right-angled, such as a square shaped frame part, whereby the locking assembly y is arranged by projections y1 placed at the corners of the frame part and preferably by recesses y2 of the same shape, that are placed underside the surface structure. To the bottom surface of the surface structure there has been arranged preferably an integral support arrangement 1a, that comprises a platform structure projecting from the basic wall thickness s of the surface structure, such as the thermal insulation layer 1'. The frame part x1 of the joint piece x, that has an open center, such as a framework-like structure is arranged to pass the recesses 1a' existing in the platform structure 1a, whereby the height of the recesses is arranged to correspond essentially at least to the thickness h of the frame part x1.

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With reference particularly to figs 1 and 2, at each corner of the surface structure there has been arranged two recesses y2 one after the other at each side. This enables first of all that, that with only one joint piece x e.g. as shown in figs 3a and 3b it is possible to couple four surface structures with each other by the corners of the same or e.g. when a straight gable edge is being formed only two surface structures side by side.

Furthermore with reference to fig. 2a, the platform structure 1a is arranged by single and square shaped platforms 1a", that are placed advantageously all over the bottom surface of the surface structure, whereby the frame part x1 of the joint piece is arranged to embed preferably for platforms 1a".

As an advantageous embodiment, the surface structures are square shaped, the dimensions of which are e.g. 1500 x 1500 mm, in which case the joint arrangement comprises coupling means z, such as male-female couplers z1, z2 being placed at the outer edges of the surface structure, that are carried out in the solution according to the invention advantageously in a way, that both the male and female couplers z1, z2 are arranged at opposite outer edges of the surface structure as shown in fig. 1. Furthermore as an advantageous embodiment with reference particularly to figs 2b and 2c, the male couplers z1 are arranged by projections being placed at the lower edges of the longitudinal p1 outer edges of the surface structure and correspondingly the female couplers z2 by recesses being placed at the lower edges of the crosswise p2 outer edges. In this way particularly coupling of the surface structures with each other is enabled in a way, that the following surface structure to be installed may be attached to the surface structures, that are installed already on the ground, after coup-

ling of the male coupler z1 existing at the outer edge of the same by lowering thereafter the outer surface being equipped with female coupler z2 essentially freely from above to its place and by locking the corners of the same to the above by means of joint pieces x.

Furthermore as an advantageous embodiment with reference to the views shown particularly in figs 2b and 2c, the male and female couplers z1, z2 comprise furthermore an auxiliary support/sealing assembly z3, that is carried out by such as counterpart surfaces or the like being placed at the upper edge of the outer surface of the surface structure at an angle  $\alpha$ , that deviates essentially from the vertical direction, preferably at an angle of  $15^\circ$  and being directed to opposite direction and/or to the same direction in respect to the surface structure. With counterpart surfaces being directed to opposite directions it is first of all possible to achieve an auxiliary locking arrangement of a so called snap-joint type, and by means of counterpart surfaces being directed to the same direction as shown in figs 2b and 2c, the joint between the surface structures may get sealed.

It is obvious, that the invention is not limited to the embodiments presented or described above, but it can be modified within the basic idea even to a great extent. In this connection it is naturally possible to equip the surface structure to be used in connection with the joint arrangement more abundantly by exploiting e.g. separate support arrangements according to traditional practice or auxiliary reinforcing plates or the like in the surface structures. It is furthermore naturally possible to put up each single surface structure e.g. of several frame parts, that are connected to each other by suitable fastening arrangements either during manufacturing or that may be put

together during installation in site. In this connection the surface structures may be connected by other types of joint pieces also, deviating from the type of joint piece being shown above, which reach e.g. further to the center parts of the surface structure. It is furthermore naturally possible to use different kinds of coatings, also, for coating of the surface structure either by the upper surface or the bottom surface of the same. Correspondingly the surface structure as such or the thermal insulation layer belonging to the same may be made of EPS-material, such as expanded polystyrene foam or styrox, XPS-material, such as extruded polystyrene foam, EPP-material, such as expanded polypropylene foam or extruded polyethylene foam or e.g. extruded PVC-structural foam sheet. In a corresponding manner it is naturally possible to make the joint piece belonging to the joint arrangement of most heterogeneous materials, such as of wood, metal, plastics, reinforced plastics, ceramics etc.

Claims

1. Joint arrangement for a surface structure, such as a protecting plate, element or the like, which surface structure is meant particularly for covering of ground together with one or several other surface structures for temporary protecting, coating and/or like of the ground, whereby in connection with each surface structure there has been arranged at least a joint arrangement for removable attachment of one or several adjacent surface structures to the same and thermal insulation (1), that comprises at least one, essentially plastic based, such as cellular, expanded, foamed plastic structured or a like thermal insulation layer (1'), whereby the joint arrangement comprises a joint piece (x), that is to be coupled by means of a locking assembly (y), for coupling of the adjacent surface structures with each other essentially by corners of the same, which joint piece (x) comprises known as such a right-angled, such as a square shaped frame part, whereby the locking assembly (y) is arranged by projections (y1) placed at the corners of the frame part and preferably by recesses (y2) of the same shape, that are placed underside the surface structure, and whereby to the bottom surface of the surface structure there has been arranged preferably an integral support arrangement (1a), that comprises a platform structure projecting from the basic wall thickness (s) of the surface structure, such as the thermal insulation layer (1'), **characterized** in, that the frame part (x1) of the joint piece (x), that has an open center, such as a framework-like structure is arranged to pass the recesses (1a') existing in the platform structure (1a), whereby the height of the recesses is arranged to correspond essentially at least to the thickness (h) of the frame part (x1).

2. Joint arrangement according to claim 1, **characterized** in, that the platform structure (1a) is arranged by single and square shaped platforms (1a"), that are placed preferably all over the bottom surface of the surface structure, whereby the framepart (x1) of the joint piece is arranged to embed preferably four platforms (1a").

3. Joint arrangement according to claim 1 or 2, **characterized** in, that at each corner of the surface structure there has been arranged two recesses (y2) one after the other at each side.

4. Joint arrangement according to any of the claims 1-3 in an essentially square shaped surface structure, whereby the joint arrangement comprises coupling means (z), such as male-female couplers (z1, z2) being placed at the outer edges of the surface structures, **characterized in**, that both the male and female couplers (z1, z2) are arranged at opposite outer edges of the surface structure.

5. Joint arrangement according to claim 4, **characterized in**, that the male couplers (z1) are arranged by projections being placed at the lower edges of the longitudinal (p1) outer edges of the surface structure and correspondingly the female couplers (z2) by recesses being placed at the lower edges of the crosswise (p2) outer edges.

6. Joint arrangement according to claim 4 or 5, **characterized in**, that the male and female couplers (z1, z2) comprise an auxiliary support/sealing assembly (z3), that is carried out by such as counterpart surfaces or the like being placed at the upper edge of the outer surface of the surface structure at an angle ( $\alpha$ ), that deviates essentially from the vertical direction, preferably at an angle of 15°, and being

directed to opposite directions and/or to the same direction in respect to the surface structure.

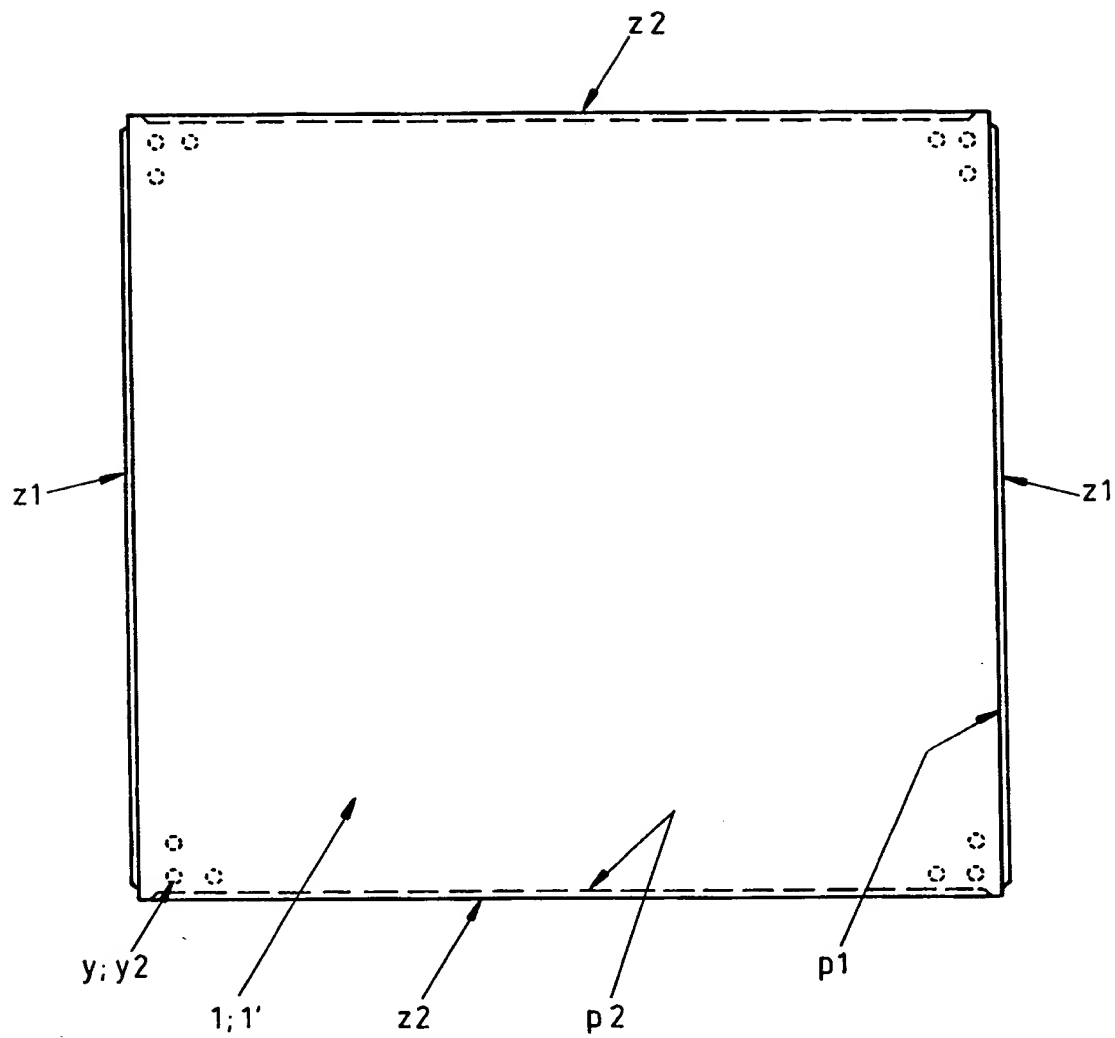
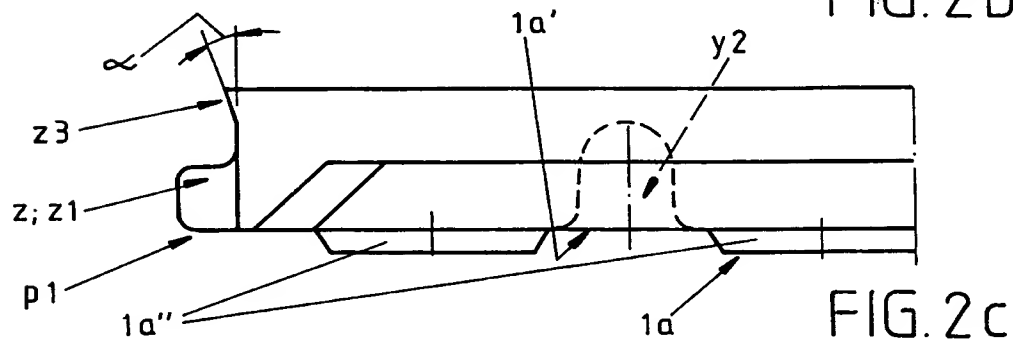
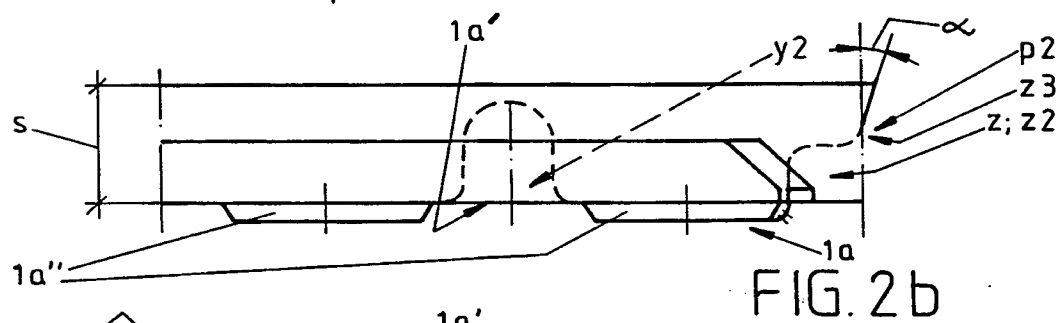
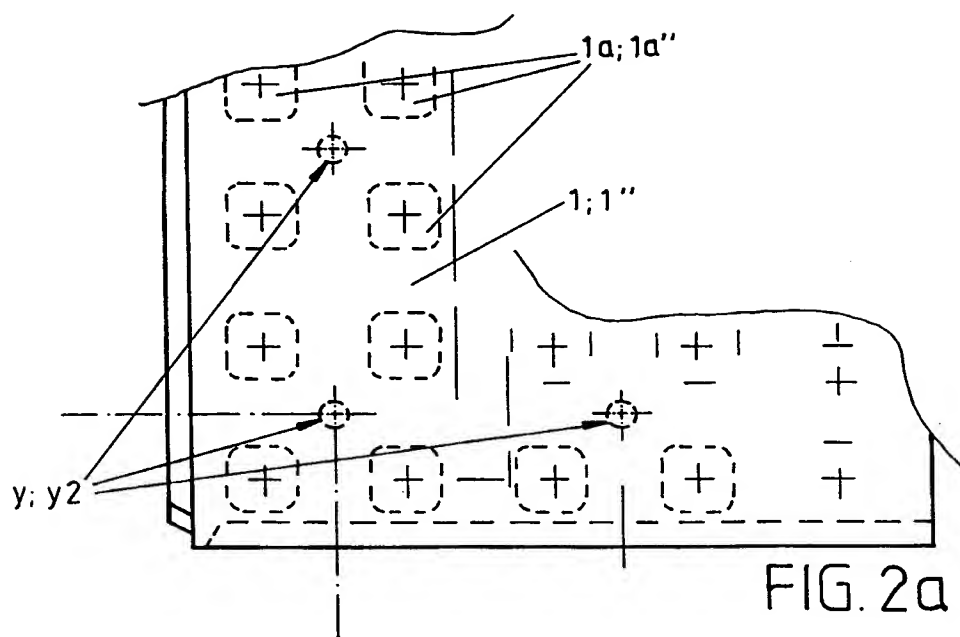


FIG. 1





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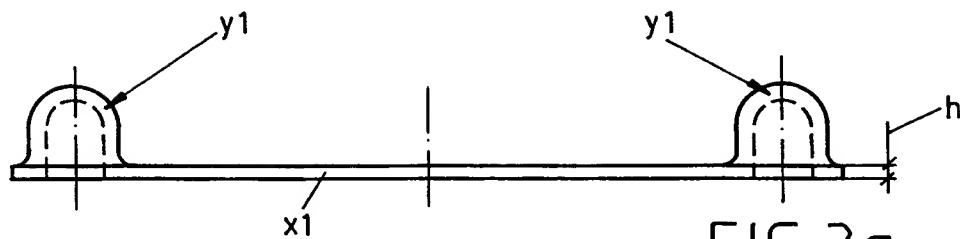


FIG. 3a

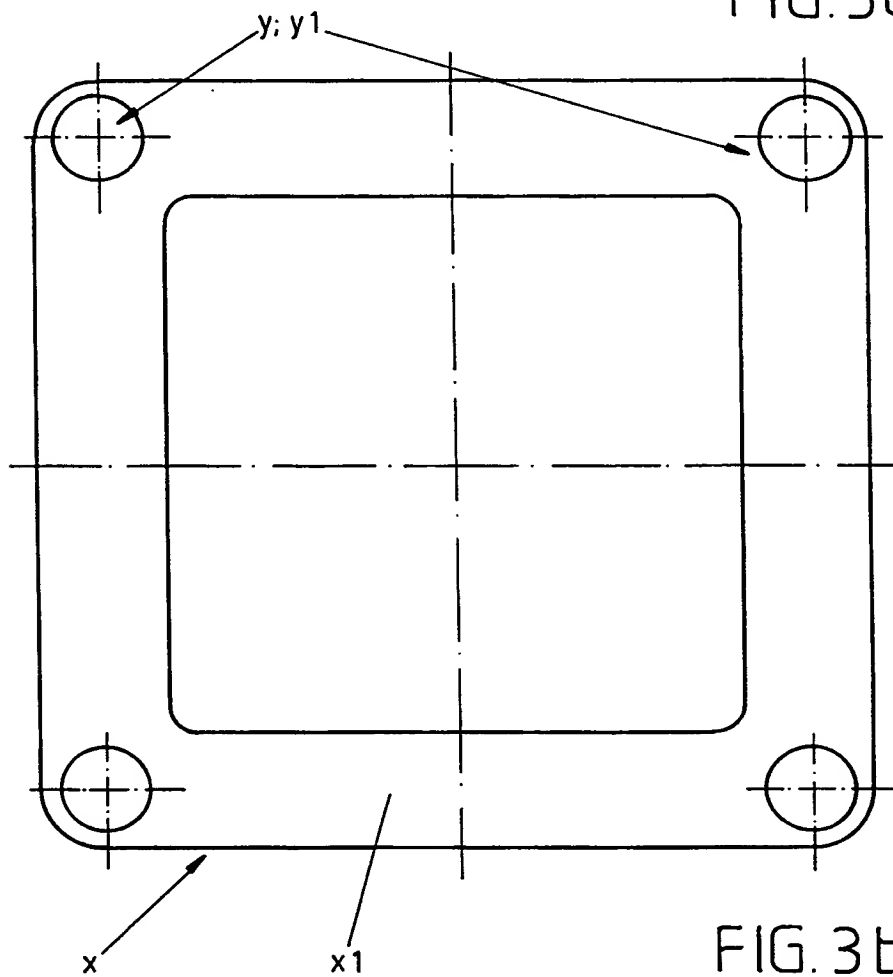


FIG. 3b

# 1

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/FI 98/00307

### A. CLASSIFICATION OF SUBJECT MATTER

IPC6: E01C 13/04, E01C 5/20, E04F 15/10, A63C 19/12  
According to International Patent Classification (IPC) or to both national classification and IPC

### B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: E01C, A63C, E04F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

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### C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	DE 2558967 A1 (STEINKOPFF, DIETRICH), 7 July 1977 (07.07.77), figure 1 --	1-6
A	DE 2717625 A1 (ROYALTY S.A.), 27 October 1977 (27.10.77), figure 6, details 6a, 6b --	1-6
A	DE 3545748 A1 (BATTERMANN, WALTER), 25 June 1987 (25.06.87), detail 7 --	1-6
A	DE 4414341 A1 (PERMESANG, CLAUS), 14 Sept 1995 (14.09.95), abstract --	1-6

☒ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

\* Special categories of cited documents:

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Date of the actual completion of the international search

30 July 1998

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# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/FI 98/00307

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4568584 A (HOLLAND), 4 February 1986 (04.02.86), detail 46  --	1-6
A	EP 0077873 A1 (FIRMA CARL FREUDENBERG), 4 May 1983 (04.05.83), detail 2  -- -----	1-6

**INTERNATIONAL SEARCH REPORT**

Information on patent family members

30/06/98

International application No.

PCT/FI 98/00307

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 2558967 A1	07/07/77	NONE	
DE 2717625 A1	27/10/77	BE 853902 A CH 601568 A FR 2349680 A,B GB 1570451 A NL 7704559 A US 4161558 A	16/08/77 14/07/78 25/11/77 02/07/80 28/10/77 17/07/79
DE 3545748 A1	25/06/87	NONE	
DE 4414341 A1	14/09/95	DE 9403780 U EP 0671508 A	06/07/95 13/09/95
US 4568584 A	04/02/86	NONE	
EP 0077873 A1	04/05/83	SE 0077873 T3 DE 3142538 A	11/05/83

## PATENT COOPERATION TREATY

## PCT

## INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference <b>AA 446</b>	<b>FOR FURTHER ACTION</b> see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. <b>PCT/FI 98/00307</b>	International filing date (day/month/year) <b>8 April 1998</b>	(Earliest) Priority Date (day/month/year) <b>16 April 1997</b>
Applicant <b>Variform OY et al</b>		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 3 sheets.



It is also accompanied by a copy of each prior art document cited in this report.

1. ☐ Certain claims were found unsearchable (See Box I).
2. ☐ Unity of invention is lacking (See Box II).
3. ☐ The international application contains disclosure of a nucleotide and/or amino acid sequence listing and the international search was carried out on the basis of the sequence listing
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6. The figure of the drawings to be published with the abstract is:
  - Figure No. 3 ☒ as suggested by the applicant. ☐ None of the figures.
  - ☐ because the applicant failed to suggest a figure.
  - ☐ because this figure better characterizes the invention.

<b>A. CLASSIFICATION OF SUBJECT MATTER</b>														
IPC6: E01C 13/04, E01C 5/20, E04F 15/10, A63C 19/12 According to International Patent Classification (IPC) or to both national classification and IPC														
<b>B. FIELDS SEARCHED</b>														
Minimum documentation searched (classification system followed by classification symbols)														
IPC6: E01C, A63C, E04F														
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched														
SE,DK,FI,NO classes as above														
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)														
WPI														
<b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>														
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.												
A	DE 2558967 A1 (STEINKOPFF, DIETRICH), 7 July 1977 (07.07.77), figure 1 --	1-6												
A	DE 2717625 A1 (ROYALTY S.A.), 27 October 1977 (27.10.77), figure 6, details 6a, 6b --	1-6												
A	DE 3545748 A1 (BATTERMANN, WALTER), 25 June 1987 (25.06.87), detail 7 --	1-6												
A	DE 4414341 A1 (PERMESANG, CLAUS), 14 Sept 1995 (14.09.95), abstract --	1-6												
<input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C. <input checked="" type="checkbox"/> See patent family annex.														
<table border="0"><tr><td>* Special categories of cited documents:</td><td>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</td></tr><tr><td>"A" document defining the general state of the art which is not considered to be of particular relevance</td><td>"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone</td></tr><tr><td>"E" earlier document but published on or after the international filing date</td><td>"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art</td></tr><tr><td>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</td><td>"&amp;" document member of the same patent family</td></tr><tr><td>"O" document referring to an oral disclosure, use, exhibition or other means</td><td></td></tr><tr><td>"P" document published prior to the international filing date but later than the priority date claimed</td><td></td></tr></table>			* Special categories of cited documents:	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention	"A" document defining the general state of the art which is not considered to be of particular relevance	"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone	"E" earlier document but published on or after the international filing date	"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art	"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&" document member of the same patent family	"O" document referring to an oral disclosure, use, exhibition or other means		"P" document published prior to the international filing date but later than the priority date claimed	
* Special categories of cited documents:	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention													
"A" document defining the general state of the art which is not considered to be of particular relevance	"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone													
"E" earlier document but published on or after the international filing date	"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art													
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&" document member of the same patent family													
"O" document referring to an oral disclosure, use, exhibition or other means														
"P" document published prior to the international filing date but later than the priority date claimed														
Date of the actual completion of the international search		Date of mailing of the international search report												
30 July 1998		05-08-1998												
Name and mailing address of the ISA/ Swedish Patent Office Box 5055, S-102 42 STOCKHOLM Facsimile No. +46 8 666 02 86		Authorized officer  Örjan Nylund Telephone No. +46 8 782 25 00												

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/PT 98/00307

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4568584 A (HOLLAND), 4 February 1986 (04.02.86), detail 46  --	1-6
A	EP 0077873 A1 (FIRMA CARL FREUDENBERG), 4 May 1983 (04.05.83), detail 2  -- -----	1-6



## INTERNATIONAL SEARCH REPORT

Information on patent family members.

30/06/98

International application No.

PCT/FR 98/00307

Patent document cited in search report			Publication date	Patent family member(s)	Publication date
DE	2558967	A1	07/07/77	NONE	
DE	2717625	A1	27/10/77	BE 853902 A CH 601568 A FR 2349680 A,B GB 1570451 A NL 7704559 A US 4161558 A	16/08/77 14/07/78 25/11/77 02/07/80 28/10/77 17/07/79
DE	3545748	A1	25/06/87	NONE	
DE	4414341	A1	14/09/95	DE 9403780 U EP 0671508 A	06/07/95 13/09/95
US	4568584	A	04/02/86	NONE	
EP	0077873	A1	04/05/83	SE 0077873 T3 DE 3142538 A	11/05/83

# PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

## PCT

To:

Kangasmäki, Reijo Finnish  
Patent Consulting FPC  
Hermiankatu 14  
FIN-33720 TAMPERE

### NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL SEARCH REPORT OR THE DECLARATION

(PCT Rule 44.1)

Date of mailing  
(day/month/year)

05-08-1998

Applicant's or agent's file reference

AA 446

**FOR FURTHER ACTION** See paragraphs 1 and 4 below

International application No.

PCT/FI98/00307

International filing date  
(day/month/year)

08-04-1998

Applicant

Variform OY  
et al

1. ☒ The applicant is hereby notified that the international search report has been established and is transmitted herewith.

**Filing of amendments and statement under Article 19:**

The applicant is entitled, if he so wishes, to amend the claims of the international application (see Rule 46):

**When?** The time limit for filing such amendments is normally 2 months from the date of transmittal of the international search report; however, for more details, see the notes on the accompanying sheet.

**Where?** To the International Bureau of WIPO  
34, chemin des Colombettes  
1211 Geneva 20, Switzerland  
Facsimile No.: (41-22) 740.14.35

For more detailed instructions, see notes on the accompanying sheet.

2. ☐ The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect is transmitted herewith.

3. ☐ With regard to the protest against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:

☐ the protest together with the decision thereon has been transmitted to the International Bureau together with the applicant's request to forward the texts of both the protest and the decision thereon to the designated Offices.

☐ no decision has been made yet on the protest: the applicant will be notified as soon as a decision is made.

4. **Further action(s):** The applicant is reminded of the following:

Shortly after 18 months from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau as provided in Rules 90bis.1 and 90bis.3, respectively, before the completion of the technical preparations for international publication.

Within 19 months from the priority date, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase until 30 months from the priority date (in some Offices even later).

Within 20 months from the priority date, the applicant must perform the prescribed acts for entry into the national phase before all designated Offices which have not been elected within 19 months from the priority date or could not be elected because they are not bound by Chapter II.

Name and mailing address of the ISA/

Patent- och registreringsverket  
Box 5055  
S-102 42 STOCKHOLM  
Facsimile No.: 08-667 72 88

Telex  
17978  
PATOREG-S

Authorized officer

Monica Norlin

Telephone No. 08-782 25 00

## PATENT COOPERATION TREATY

PCT

NOTIFICATION OF RECEIPT OF  
RECORD COPY

(PCT Rule 24.2(a))

From the INTERNATIONAL BUREAU

To:

KANGASMÄKI, Reijo  
Finnish Patent Consulting FPC  
Hermiankatu 14  
FIN-33720 Tampere  
FINLANDE

<b>Date of mailing (day/month/year)</b> 30 April 1998 (30.04.98)	<b>IMPORTANT NOTIFICATION</b>
<b>Applicant's or agent's file reference</b> AA 446	<b>International application No.</b> PCT/FI98/00307

The applicant is hereby notified that the International Bureau has received the record copy of the international application as detailed below.

Name(s) of the applicant(s) and State(s) for which they are applicants:

VARIFORM OY (for all designated States except US)  
VALTANEN, Jarkko (for US)

International filing date : 08 April 1998 (08.04.98)

Priority date(s) claimed : 16 April 1997 (16.04.97)

Date of receipt of the record copy  
by the International Bureau : 28 April 1998 (28.04.98)

List of designated Offices :

AP : GH, GM, KE, LS, MW, SD, SZ, UG, ZW

EA : AM, AZ, BY, KG, KZ, MD, RU, TJ, TM

EP : AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE

OA : BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG

National : AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, GM,  
GW, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL,  
PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW

## ATTENTION

The applicant should carefully check the data appearing in this Notification. In case of any discrepancy between these data and the indications in the international application, the applicant should immediately inform the International Bureau.

In addition, the applicant's attention is drawn to the information contained in the Annex, relating to:

☒ time limits for entry into the national phase;

☐ confirmation of precautionary designations;

☐ requirements regarding priority documents.

A copy of this Notification is being sent to the receiving Office and to the International Searching Authority.

The International Bureau of WIPO  
34, chemin des Colombettes  
1211 Geneva 20, Switzerland

Facsimile No. (41-22) 740.14.35

Authorized officer:

Aino Metcalfe

Telephone No. (41-22) 338.83.38

## INFORMATION ON TIME LIMITS FOR ENTERING THE NATIONAL PHASE

The applicant is reminded that the "national phase" must be entered before each of the designated Offices indicated in the Notification of Receipt of Record Copy (Form PCT/IB/301) by paying national fees and furnishing translations, as prescribed by the applicable national laws.

The time limit for performing these procedural acts is **20 MONTHS** from the priority date or, for those designated States which the applicant elects in a demand for international preliminary examination or in a later election, **30 MONTHS** from the priority date, provided that the election is made before the expiration of 19 months from the priority date. Some designated (or elected) Offices have fixed time limits which expire even later than 20 or 30 months from the priority date. In other Offices an extension of time or grace period, in some cases upon payment of an additional fee, is available.

In addition to these procedural acts, the applicant may also have to comply with other special requirements applicable in certain Offices. It is the applicant's responsibility to ensure that the necessary steps to enter the national phase are taken in a timely fashion. Most designated Offices do not issue reminders to applicants in connection with the entry into the national phase.

For detailed information about the procedural acts to be performed to enter the national phase before each designated Office, the applicable time limits and possible extensions of time or grace periods, and any other requirements, see the relevant Chapters of Volume II of the PCT Applicant's Guide. Information about the requirements for filing a demand for international preliminary examination is set out in Chapter IX of Volume I of the PCT Applicant's Guide.

GR and ES became bound by PCT Chapter II on 7 September 1996 and 6 September 1997, respectively, and may, therefore, be elected in a demand or a later election filed on or after 7 September 1996 and 6 September 1997, respectively, regardless of the filing date of the international application. (See second paragraph above.)

Note that only an applicant who is a national or resident of a PCT Contracting State which is bound by Chapter II has the right to file a demand for international preliminary examination.

## CONFIRMATION OF PRECAUTIONARY DESIGNATIONS

This notification lists only specific designations made under Rule 4.9(a) in the request. It is important to check that these designations are correct. Errors in designations can be corrected where precautionary designations have been made under Rule 4.9(b). The applicant is hereby reminded that any precautionary designations may be confirmed according to Rule 4.9(c) before the expiration of 15 months from the priority date. If it is not confirmed, it will automatically be regarded as withdrawn by the applicant. There will be no reminder and no invitation. Confirmation of a designation consists of the filing of a notice specifying the designated State concerned (with an indication of the kind of protection or treatment desired) and the payment of the designation and confirmation fees. Confirmation must reach the receiving Office within the 15-month time limit.

## REQUIREMENTS REGARDING PRIORITY DOCUMENTS

For applicants who have not yet complied with the requirements regarding priority documents the following is recalled.

Where the priority of an earlier national (i.e., national or regional) application is claimed, the applicant must submit a copy of the said national application, certified by the authority with which it was filed ("the priority document") to the receiving Office (which will transmit it to the International Bureau) or directly to the International Bureau, before the expiration of 16 months from the priority date (Rule 17.1).

Where the priority document is issued by the receiving Office, the applicant may, instead of submitting the priority document, request the receiving Office to prepare and transmit the priority document to the International Bureau. Such request must be made before the expiration of the 16-month time limit.

It is recalled that, where several priorities are claimed, the priority date to be considered for the purposes of computing the 16-month time limit is the filing date of the earliest application whose priority is claimed.

If the priority document concerned is not submitted to the International Bureau before the expiration of the 16-month time limit, or if the request to the receiving Office to transmit the priority document has not been made (and the corresponding fee, if any, paid) before the expiration of this time limit, any designated State may disregard the priority claim.

# PATENT COOPERATION TREATY

## PCT

COMMUNICATION IN CASES FOR WHICH  
NO OTHER FORM IS APPLICABLE

From the INTERNATIONAL BUREAU

To:

KANGASMÄKI, Reijo  
Finnish Patent Consulting FPC  
Hermiankatu 14  
FIN-33720 Tampere  
FINLANDE

Date of mailing (day/month/year) 30 April 1998 (30.04.1998)	
Applicant's or agent's file reference AA 446	<b>REPLY DUE</b> see paragraph 1 below
International application No. PCT/FI98/00307	International filing date (day/month/year) 08 April 1998 (08.04.1998)
Applicant VARIFORM OY	

- ☐ REPLY DUE within \_\_\_\_\_ months/days from the above date of mailing  
☐ NO REPLY DUE, however, see below  
☒ IMPORTANT COMMUNICATION  
☐ INFORMATION ONLY

2. COMMUNICATION:

Under the patent law of Cyprus that entered into force on 01 April 1998 (01.04.98), it is not possible in an international application to designate Cyprus for a national patent, and Cyprus may be designated only for a European patent.

The purported designation of Cyprus for a national patent has therefore been cancelled *ex officio* by the International Bureau and the designation "EP" has been corrected to include "CY Cyprus" in the list of States covered by that designation.

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No. (41-22) 740.14.35	Authorized officer Aino Metcalf Telephone No. (41-22) 338.83.38
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# PATENT COOPERATION TREATY

## PCT

### INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference AA 446	<b>FOR FURTHER ACTION</b>		See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
International application No. PCT/FI98/00307	International filing date ( <i>day/month/year</i> ) 08.04.1998	Priority date ( <i>day/month/year</i> ) 16.04.1997	
International Patent Classification (IPC) or national classification and IPC <sub>6</sub> E01C 13/04, E01C 5/20, E04F 15/10, A63C 19/12			
Applicant VARIFORM OY et al			

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 3 sheets, including this cover sheet.

☐ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of \_\_\_\_\_ sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand  02.11.1998	Date of completion of this report  02.07.1999
Name and mailing address of the IPEA/SE Patent- och registreringsverket Box 5055 S-102 42 STOCKHOLM Facsimile No. 08-667 72 88	Authorized officer  Örjan Nylund / MR Telephone No. 08-782 25 00

# INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/FI98/00307

## I. Basis of the report

1. This report has been drawn on the basis of *(Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments.)*:

- ☒ the international application as originally filed.
- ☐ the description, pages \_\_\_\_\_, as originally filed,  
 pages \_\_\_\_\_, filed with the demand,  
 pages \_\_\_\_\_, filed with the letter of \_\_\_\_\_,  
 pages \_\_\_\_\_, filed with the letter of \_\_\_\_\_.
- ☐ the claims, Nos. \_\_\_\_\_, as originally filed,  
 Nos. \_\_\_\_\_, as amended under Article 19,  
 Nos. \_\_\_\_\_, filed with the demand,  
 Nos. \_\_\_\_\_, filed with the letter of \_\_\_\_\_,  
 Nos. \_\_\_\_\_, filed with the letter of \_\_\_\_\_.
- ☐ the drawings, sheets/fig \_\_\_\_\_, as originally filed,  
 sheets/fig \_\_\_\_\_, filed with the demand  
 sheets/fig \_\_\_\_\_, filed with the letter of \_\_\_\_\_,  
 sheets/fig \_\_\_\_\_, filed with the letter of \_\_\_\_\_.

2. The amendments have resulted in the cancellation of:

- ☐ the description, pages \_\_\_\_\_
- ☐ the claims, Nos. \_\_\_\_\_
- ☐ the drawings, sheets/fig \_\_\_\_\_

3. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the supplemental Box (Rule 70.2(c)).

4. Additional observations, if necessary:

## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International Application No.

PCT/FI98/00307

**V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement****1. Statement**

Novelty (N)	Claims	<u>1-6</u>	YES
	Claims		NO
Inventive step (IS)	Claims	<u>1-6</u>	YES
	Claims		NO
Industrial applicability (IA)	Claims	<u>1-6</u>	YES
	Claims		NO

**2. Citations and explanations**

The invention relates to a joint arrangement for a surface structure such as a protecting plate. By means of joint arrangements a number of surface structures may be coupled together to form a temporary ground protection.

The purpose of the invention is to provide a joint arrangement, which makes it possible to assemble protective structures easily, and at the same time provide a reliable and seamless joint.

The joint arrangement according to the invention is characterised in, that the frame part (x1) of the joint piece (x) that has an open center, such as a framework-like structure is arranged to pass the recesses (1a') existing in the platform structure (1a). The height of the recesses is arranged to correspond essentially at least to the thickness of the frame part (x1).

The cited documents describe different protecting plates provided with joint arrangements.

However, non of the cited documents describe a joint arrangement where a frame part of a joint piece is arranged to pass recesses in a platform structure where the height of the recesses is arranged to correspond essentially at least to the thickness of the frame part.

The claimed invention is therefore novel. It can also be considered to involve an inventive step and to have industrial applicability.



## PATENT COOPERATION TREATY

PCT

REC'D 19 JUL 1999

WIPO PCT

## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference AA 446	<b>FOR FURTHER ACTION</b> See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/FI98/00307	International filing date (day/month/year) 08.04.1998	Priority date (day/month/year) 16.04.1997
International Patent Classification (IPC) or national classification and IPC <sub>6</sub> E01C 13/04, E01C 5/20, E04F 15/10, A63C 19/12		
Applicant VARIFORM OY et al		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 3 sheets, including this cover sheet.

☐ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

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3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand 02.11.1998	Date of completion of this report 02.07.1999
Name and mailing address of the IPEA/SE Patent- och registreringsverket Box 5055 S-102 42 STOCKHOLM Facsimile No. 08-667 72 88 Form PCT/IPEA/409 (cover sheet) (January 1994)	Authorized officer Örjan Nylund / MR Telephone No. 08-782 25 00

# INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/FI98/00307

## I. Basis of the report

1. This report has been drawn on the basis of *(Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments.)*:

☒ the international application as originally filed.

☐ the description, pages \_\_\_\_\_, as originally filed,  
 pages \_\_\_\_\_, filed with the demand,  
 pages \_\_\_\_\_, filed with the letter of \_\_\_\_\_,  
 pages \_\_\_\_\_, filed with the letter of \_\_\_\_\_.

☐ the claims, Nos. \_\_\_\_\_, as originally filed,  
 Nos. \_\_\_\_\_, as amended under Article 19,  
 Nos. \_\_\_\_\_, filed with the demand,  
 Nos. \_\_\_\_\_, filed with the letter of \_\_\_\_\_,  
 Nos. \_\_\_\_\_, filed with the letter of \_\_\_\_\_.

☐ the drawings, sheets/fig \_\_\_\_\_, as originally filed,  
 sheets/fig \_\_\_\_\_, filed with the demand  
 sheets/fig \_\_\_\_\_, filed with the letter of \_\_\_\_\_,  
 sheets/fig \_\_\_\_\_, filed with the letter of \_\_\_\_\_.

2. The amendments have resulted in the cancellation of:

☐ the description, pages \_\_\_\_\_

☐ the claims, Nos. \_\_\_\_\_

☐ the drawings, sheets/fig \_\_\_\_\_

3. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the supplemental Box (Rule 70.2(c)).

4. Additional observations, if necessary:

## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/FI98/00307

**V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement****1. Statement**

Novelty (N)	Claims	<u>1-6</u>	YES
	Claims		NO
Inventive step (IS)	Claims	<u>1-6</u>	YES
	Claims		NO
Industrial applicability (IA)	Claims	<u>1-6</u>	YES
	Claims		NO

**2. Citations and explanations**

The invention relates to a joint arrangement for a surface structure such as a protecting plate. By means of joint arrangements a number of surface structures may be coupled together to form a temporary ground protection.

The purpose of the invention is to provide a joint arrangement, which makes it possible to assemble protective structures easily, and at the same time provide a reliable and seamless joint.

The joint arrangement according to the invention is characterised in, that the frame part (x1) of the joint piece (x) that has an open center, such as a framework-like structure is arranged to pass the recesses (1a') existing in the platform structure (1a). The height of the recesses is arranged to correspond essentially at least to the thickness of the frame part (x1).

The cited documents describe different protecting plates provided with joint arrangements.

However, non of the cited documents describe a joint arrangement where a frame part of a joint piece is arranged to pass recesses in a platform structure where the height of the recesses is arranged to correspond essentially at least to the thickness of the frame part.

The claimed invention is therefore novel. It can also be considered to involve an inventive step and to have industrial applicability.